ABSTRACT

Disclosed is a radioactive waste treatment process for transmuting long-lived radioisotopes into short-lived radioisotopes through applied nuclear physics. Nuclear reactions, specifically of the (γ, n) type, also known as photodisintegration, are utilized to accomplish this transmutation from troublesome, long-lived radioactive waste isotope(s) of given atomic mass to shorter-lived or stable materials of lower atomic mass, by exposing the troublesome isotopes to a high energy photon flux for a sustained time. Generally speaking, the target nucleus of the radioisotope(s) to be treated is irradiated by gamma photons of an energy greater than the binding energy of the neutron in the target nucleus. This causes the irradiated nucleus to absorb the gamma rays, thereby placing the nucleus in an excited state. Upon relaxation, the nucleus ejects a neutron through the (γ, n) reaction, thereby transmuting the element to an isotope of lower atomic mass and shorter half-life.

[particle power/2993.U.S. CIP for Remediation]